

1. A reverse thermally viscosifying composition comprising:

a linear block copolymer, wherein at least a first block comprises a polyoxyalkylene having a hydrophobic region and a hydrophobic region, said polyoxyalkylene capable of aggregation in solution, and at least a second block comprises a biocompatible polymer or oligomer, dispersed in an aqueous medium, said composition characterized in that it viscosifies in response to an environmental stimulus.

2. The composition of claim 1, wherein said polyoxyalkylene comprises polyoxyethylene and polyoxypropylene.

3. The composition of claim 1, wherein said polyoxyalkylene comprises an alkyl poloxamer of the formula, $R-(CH_2CH_2)_nO-$, where R is an alkylene or arylalkylene moiety and n is in the range of 5 to 100.

4. The composition of claim 1, wherein the biocompatible polymer or oligomer is a bioadhesive or mucoadhesive.

5. The composition of claim 1, wherein the biocompatible polymer or oligomer comprises a poly(vinylcarboxylic acid) and derivatives thereof.

6. The composition of claim 5, wherein the poly(vinylcarboxylic acid) is selected from the group consisting of acrylic acid, substituted acrylic acid, methacrylic acid, substituted methacrylic acids, acids, and ionized forms thereof.

7. The composition of claim 1, wherein the polyoxyalkylene comprises a triblock polymer of polyoxyethylene (POE) and polyoxypropylene (POP) having the formula $(POP)_a(POE)_b(POP)_a$, where a is in the range of 10-50 and b is in the range of 50-70.

8. The composition of claim 1, wherein the viscosification occurs at a temperature in the range of about 22 to 40°C.

9. The composition of claim 1, wherein the viscosification occurs at a temperature in the range of about 30 to 37°C.

10. A block copolymer, comprising:

at least one polymer or oligomer block including a polyoxyalkylene; and

at least one block comprises a biocompatible polymer or oligomer, wherein said block polymer is a linear block copolymer.

11. The block copolymer of claim 10, having the formula selected from the group consisting of:

$(CH_2CHR)_n-Q-(CH_2CH_2O)_x(CH_2CH(CH_3)O)_y(CH_2CH_2O)_x-Q-(CH_2CHR)_m$, where Q is a C-C, C-O, C(O)-NH, S-C, C(O)-O functionality and the like, R is a carboxyl, and n, m, x and y, are independently selected and in the range of 1 and 1000.

12. A pharmaceutical composition, comprising:

a reverse thermally viscosifying composition including a linear block copolymer, wherein at least one block comprises a poloxamer; and at least one block comprises a biocompatible polymer or oligomer, in an aqueous medium; and

an active agent which imparts a pharmaceutic or cosmetic effect, said composition characterized in that it viscosifies in response to an environmental stimulus.

13. The composition of claim 1 or 12, wherein the reversibly gelling composition
5 is present in an amount in the range of about 0.01 to 20 wt%.

14. The pharmaceutical composition of claim 1 or 12, wherein the reversibly gelling composition is present in an amount in the range of about 0.1 to 10 wt%.

10 15. The pharmaceutical composition of claim 12, wherein the reverse thermal viscosifying composition is present in a concentration in the range of 0.01-1 wt% of total pharmaceutical composition.

15 16. The pharmaceutical composition of claim 12, wherein said composition further comprises a pharmaceutic agent selected from the group consisting of humectants and emollients.

20 17. The pharmaceutical composition of claim 12, wherein the pharmaceutical composition takes a form selected from the group consisting of lotions, creams, sticks, roll-on formulations, sprays, aerosols, pad-applied formulations and masks.

18. The pharmaceutical composition of claim 12, wherein the pharmaceutical agent is absorbable through skin or mucosal membranes.

19. The composition of claim 1 or 12, wherein the aqueous-based medium is selected from the group consisting of water, salt solutions and water with water-miscible organic compound(s).

5 20. The pharmaceutic composition of claim 12, wherein the pharmaceutical agent is absorbable through vaginal mucosal membrane.

21. The pharmaceutic composition of claim 12, wherein the pharmaceutical agent is absorbable through nasal mucosal membrane.

10

22. The pharmaceutic composition of claim 12, wherein the pharmaceutical agent is absorbable through rectal mucosal membrane.

15 23. The pharmaceutic composition of claim 12, wherein the pharmaceutical agent is absorbable through otic mucosal membrane.

24. The pharmaceutic composition of claim 12, wherein the pharmaceutical agent is absorbable through ophthalmic mucosal membrane.

20 25. The pharmaceutic composition of claim 12, wherein the pharmaceutical agent is absorbable through esophageal mucosal membrane.

26. The pharmaceutic composition of claim 12, wherein the pharmaceutical agent is absorbable through oral cavity membrane.

25

27. The pharmaceutical composition of claim 23, wherein the pharmaceutically active agent is selected from the group consisting of miotics, sympathomimetics, beta-blockers, prostaglandin derivatives, muscarinic antagonists, anti-infectives and carbonic anhydrase inhibitors.

5

28. The pharmaceutical composition of claim 12, further comprising acceptable antioxidants.

29. The pharmaceutical composition of claim 12, further comprising isotonicizing agents.

10

30. The pharmaceutical composition of claim 12, further comprising a buffer.

31. The pharmaceutical composition of claim 12, further comprising preservative

15

32. The pharmaceutical composition of claim 20, wherein the pharmaceutically active agent is selected from the group consisting of natural and synthetic hormones, anti-fungals, contraceptives, anti-yeast agents, steroids, moisturizers, spermicides, anti-virals, analgesics and anaesthetics.

20

33. The pharmaceutical composition of claim 12, wherein the pharmaceutically active agent is selected from the group consisting of anti-ulcer agents, sucralfate, H₂-blocking agents, antipyretics, analgesics, antacids, antiflatulents, anticonvulsants, antidiarrheals, antifungals, antihypertensives, antihistamines, antipruritics, anti-infectives, anti-nauseants, antireflux agents, antispasmodics, contraceptives, hormonals, steroids, cough/cold remedies,

25

diuretics, laxatives, tranquilizers, muscle relaxants, mineral supplements, sedatives, vitamins and mixtures thereof.

34. The pharmaceutic composition of claim 33, further comprising flavoring.

5

35. The pharmaceutic composition of claim 21 or 23, wherein the pharmaceutical composition is applied in the form of drops.

36. The pharmaceutic composition of claim 21, wherein the pharmaceutical composition is applied as a spray.

10

37. The pharmaceutic composition of claim 21, wherein the pharmaceutically active agent is selected from the group consisting of decongestants, antihistamines, anti-osteoporosis agents, hormones, antineoplastic agents, Parkinsonism drugs and vaccines.

15

38. The pharmaceutic composition of claim 12, wherein the reversible thermal viscosifying composition is incorporated into a tablet for oral administration.

39. The pharmaceutic composition of claim 12, wherein the pharmaceutic composition is injectable.

20

40. The pharmaceutic composition of claim 16, wherein the pharmaceutically active agent is selected from the group consisting of anti-ulcer agents, sucralfate, H2-blocking agents, antipyretics, analgesics, antacids, antiflatulents, anticonvulsants, antidiarrheals, antifungals, antihypertensives, antihistamines, antipruritics, antiinfectives, antinauseants,

25

THE UNIVERSITY OF CHICAGO

5